



SONDERMANN
PUMPEN + FILTER GMBH & Co. KG

Operating Instructions

Magnetically coupled centrifugal Pumps
Types 2 / 2U / 2D
made of PP und PVDF



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EG-Konformitätserklärung

EC Declaration of Conformity

Déclaration de Conformité CE

Hiermit erklären wir, dass die Bauart der SONDERMANN magnetisch gekuppelte Kreiselpumpen 45 W - 7,5 kW in verschiedenen Werkstoffen und Ausführungen, in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entspricht:

We herewith confirm that the construction of SONDERMANN magnetically coupled centrifugal pumps 45 W - 7,5 kW of different materials and versions corresponds to the following EC-rules:

Nous confirmons que la construction des pompes centrifuges à accouplement magnétique SONDERMANN, 45 W - 7,5 kW, de matériaux et versions différents est conforme aux dispositions règlementaires suivantes:

**(1) EG-Richtlinie Maschinen
98/37/EG**

**EC Machinery Directive
98/37/CE**

**Directive CE Machines
98/37/CE**

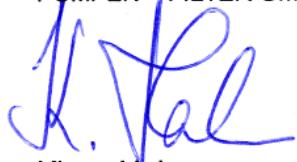
**(2) EG-Niederspannungsrichtlinie
73/23/EWG
93/68/EWG (1. Änderung)**

**EC Low Voltage Directive
73/23/EEC
93/68/EEC (1st Amendment)**

**Directive CE Bas Voltages
73/23/CEE
93/68/CEE (1ère Modification)**

Köln, 01.09.2007

S O N D E R M A N N
PUMPEN + FILTER GMBH & Co. KG



Klaus Hahn
Geschäftsführer

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1 General information

The pump may only be used in the range of applications authorized by the manufacturer. In case of modified operating conditions, please consult your pump's supplier and / or the manufacturer.

1.1 Fields of application:

- Pumping low-viscosity liquids resembling water.
- Pumping of acids, bases and others.
- Pumping of gaseous fluids.
- Any use other than the authorized one as well as any conversion of the pump is not permitted.

CAUTION!

Make sure that the materials of which the pump is made, are resistant to the fluids delivered.

NOTE!

Ask your pump's supplier or the manufacturer for the respective chemical resistance list.

- If you deliver crystallising fluids, make sure that the fluid does not crystallise within the pump. Should this happen, carefully rinse off all parts being in contact with the fluid once the pump has been shut off.

NOTE!

Disassembly of the pump will cancel the right to all warranty claims!

Power ratings

The nameplate on the pump not only specifies its model type but also its operating data and serial number. Please indicate all these data when inquiring about an issue, reordering parts and especially when ordering spare parts. For further information, contact your pump's supplier or the manufacturer.

1.2 Technical data:

(Performance charts see page 21)

Max. volume flow:	see name plate
Max. delivery head:	see name plate
Used Materials:	PP, PVDF, stainless steel, ceramics, FKM , EPDM or FEP
Supply voltage:	see name plate
Motor power:	0,09 up to 0,25 kW
Rated current: A	see name plate
Sense of rotation:	clockwise, seen from the pump towards the motor
Rotation speedl:	900 min-1 - 3400 min-1
Protection class:	IP 55
Weight:	approx. 4,0 - 7,0 kg
Max. admissible temperature of fluid delivered:	
PP	80°C
PVDF	95°C
Maximum system pressure at 20°C:	
PP	2,5 bar
PVDF	3,5 bar

NOTE!

To find out the maximum admissible temperature of the fluid delivered, check out the materials of which the pump is made and which are indicated on the nameplate or the delivery note.

The letters written on the nameplate are to be read as follows:

PP = glass-fibre reinforced
Polypropylene
PVDF = Polyvinylidene Fluoride
K = Oxide Ceramics
G = PTFE graphite
V = gasket*)
K = ceramic sleeve bearings
K = ceramic starting ring of the pump housing
K = ceramic centering shaft

*) materials available:

V = FKM (fluorinated rubber)
E = EPDM (Ethylene-Propylene Terpolymer)
T = FEP (Fluorinated Ethylene Propylene coated)

2 Safety

When installing, operating and maintaining the pump, the mounting and operating instructions detailed in the following should be strictly observed. Hence it is absolutely necessary that prior to assembling and starting the pump, the responsible installation personnel and/or users carefully read these operating instructions. Make sure that they are always available wherever the pump is used.

Not only the safety instructions detailed in this Safety chapter are to be observed but also the specific safety instructions provided in the following chapters.

2.1 Marking of safety instructions in this operating manual

Safety instructions given in this manual and non-compliance with which could be injurious to human beings, are identified by the general:



safety sign
acc. to German DIN 4844-W standard

Warnings of electricity are identified by the specific:



safety sign
acc. to German DIN 4844-W standard

Safety instructions non-compliance with which would give rise to malfunctions of the equipment are identified by:

CAUTION!

Signs and labels affixed to the equipment such as:

- arrows indicating the sense of rotation,
- symbols indicating fluid connections,
- warnings to protect the pump from dry-running,

must be strictly observed and always kept legible.

2.2 Qualification and training of operating personnel

All personnel responsible for operation, maintenance, inspection and assembly of the pump must be adequately qualified.

Scope of responsibility and supervision of the personnel must be exactly defined by the plant operator. If staff members do not have the necessary knowledge, they should be trained and instructed accordingly. If necessary, the pump manufacturer or supplier will hold this training on behalf of the plant operator. The operator should also make sure that all operating instructions are fully understood by all personnel.

2.3 Hazards in the event of non-compliance with safety instructions

Non-compliance with safety instructions may produce a risk to personal life and health as well as to the environment and the pump and may result in a loss of any right to claim damages.

Non-compliance may involve risks such as

- failure of important functions of the pump and/or the installation;
- failure of specified procedures of service and maintenance;
- exposure of persons to electrical, mechanical, magnetic and chemical hazards;
- endangering of the environment because of hazardous substances leaking.

2.4 Working in compliance with safety regulations

When operating the pump, make sure to observe the safety instructions contained in this manual as well as the relevant national accident prevention regulations and any other service and safety instructions issued by the plant operator.

2.5 Safety instructions relevant for operating the pump

- If hot or cold machine components create any risk, they must be guarded against accidental contact.
- Guards for moving parts must not be removed from the equipment during operation.
- Hazardous (i. e. toxic, hot) fluids must be drained off to prevent any risk to persons or the environment. Statutory regulations are to be complied with in any case.
- Any hazard resulting from electricity should be ruled out completely. (For details see the German VDE specifications and the bye-laws of your local power supply utilities, for example.)

2.6 Safety instructions relevant for maintenance, inspection and assembly work

It shall be the plant operator's responsibility to ensure that all maintenance, inspection and assembly work is performed by authorized and qualified personnel who have adequately familiarized themselves with the subject matter by studying this manual in detail.

Any work on the equipment shall only be performed when it is at a standstill. Make sure to strictly follow the procedure for shutting down the equipment prescribed in this manual.

Pumps and pump units that deliver hazardous fluids must be decontaminated after use.

On completion of work all safety and protective guards must be re-installed and be fully operational again.

Prior to restarting the pump, make sure to follow the instructions detailed in the Starting chapter below.

2.7 Unauthorized alterations and production of spare parts

The user is not allowed to subject the pump to any modification unless agreed upon with the manufacturer. It is in the interest of your safety to use genuine spare parts and accessories authorized by the manufacturer. Use of other parts may exempt the manufacturer from any liability resulting thereof.

2.8 Inadmissible modes of operation

Die Betriebssicherheit der gelieferten Maschine ist nur bei bestimmungs-gemäßer Verwendung entsprechend Abschnitt 1 „Allgemeines“ der Betriebsanleitung gewährleistet. Die im Datenblatt angegebenen Grenzwerte dürfen auf keinen Fall überschritten werden.

3 Transport and storage

3.1 Transport

Das Gerät wird vom Hersteller betriebsfertig ausgeliefert. Bei Transportschäden muss in jedem Fall eine Tatbestandsaufnahme durch den Transporteur durchgeführt werden. Der Transport des Gerätes muss stets fachgerecht erfolgen.

3.2 Storage

The pump has to be stored absolutely dry and be protected from any pollutants entering.

4 Functional characteristics and accessories

4.1 General description

Magnetically coupled centrifugal pumps of type RM are non-self-priming centrifugal pumps. They operate in horizontal position and are made of plastic in monobloc design. A magnetic

coupling connects the pump to the motor and transmits the power of the motor to the impeller.

The type 2U is equipped with a non-ventilated motor and is insensitive to vapour.

The type 2D is equipped with a non-ventilated (0.25 kW) motor with two shaft ends. A pump head of size 8/60 is mounted to each side of the motor.

You may use this pump as a twin pump with one driving motor to double its delivery rate to 2 x 80 l/min. or as a twin pump in series connection (two-stage) to increase discharge pressure. Maximum delivery head then is 16 m WC.

4.2 Constructional design

Housing, impeller, impeller magnet and rear casing are made of plastic. Standard pumps are equipped with centering shafts and bearings made of oxide ceramic. The rear casing hermetically seals the fluid from the ambient atmosphere. Because of magnetic power transmission, there is no need to mechanically seal the shaft. So, in contrast to mechanically or gland sealed pumps, leakages through worn shaft sealings are definitely ruled out.



This pump is magnetically coupled. So when handling permanent-magnet components during repair or maintenance work you are exposed to magnetic forces which might influence pacemakers, for example.

Keep your distance.

The pump housing parts are sealed by static O-rings. The impeller of the pump is a radial-flow wheel. Depending on the fluid delivered, each component of the pump is available in various materials.

NOTE!

The materials used for the pump are specified on its nameplate or the delivery note.

Choice of materials:

depends of type, see nameplate

Pump housing and rear casing, impeller and impeller magnet coating	PP	PVDF
Centering shaft	oxide ceramic	
Sleeve bearings	oxide ceramic PTFE - Graphite	
Starting rings	oxide ceramic	
Static O-ring seals	FKM, EPDM, FEP (FKM and FEP coated)	

4.3 Accessories and optional equipment

Accessory components including hose connections, pilotherms, motor circuit-breakers and flow monitors, are available on request.

5 Mounting and installation

The pump should be installed at a place that allows easy access at any time. Make sure to keep to the following limit values:

Ambient temperature	-10 °C bis +40 °C
Humidity of the air max.	95% relative humidity, non-condensing

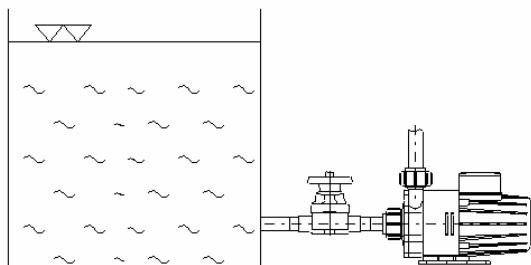
NOTE!

In case of higher ambient temperatures, please contact your pump's supplier or the manufacturer.

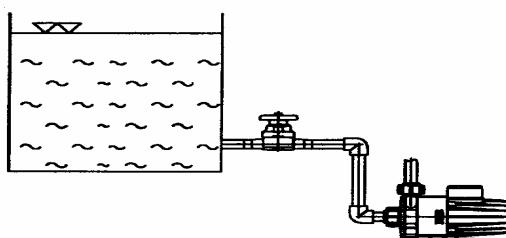
5.1 Mounting

The pump is usually mounted in horizontal position, vertical position only upon request.

This pump is not self-priming and therefore requires a feed line.



Feed line from a container above the pump:



5.2 Hose and pipe lines

Make sure that the cross-sections of the pipelines fit the suction and discharge ports. All suction and discharge lines to the pump housing should be free of tensile stress. The weight of the hose and pipe lines must not rest on the housing.

CAUTION!

Do not install any quick-acting stop valves into the pipelines, since pressure jerks will damage the pump housing.

5.2.1 Suction line

- The suction line should be a tube or hose which will not deform by the resulting partial vacuum or by high temperatures.
- The suction line should be as short as possible. Make sure to mount it so that there will be no gas accumulation.
- When dimensioning pipelines, fittings etc., make sure to keep the flow resistances as low as possible.
- Flow velocity within the fitted suction line should not exceed the limit of 1m/s.
- For easy installation and removal of the pump, a shut-off valve (but no diaphragm valve) should be built into the suction line.

CAUTION!

Do not use the shut-off valve built into the suction line to adjust the delivery rate.

5.2.2 Discharge line

- Standard flow velocity within the discharge line is 3m/s.
- To adjust the flow rate, we recommend installing a control element to the discharge line.

5.3 Electrical connection

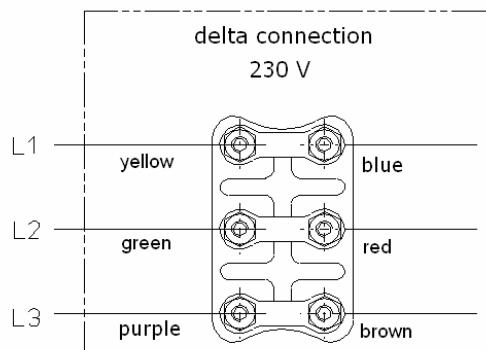


All electrical connections to the pump should be performed by experts only.

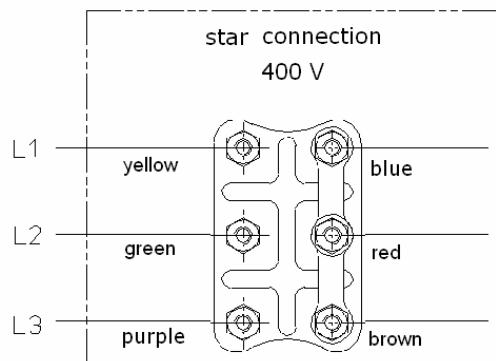
- All electrical connections and installations of additional protection devices should be performed by experts only and in accordance with the instructions of your local power supplier and/or the Association of German Electrotechnical Engineers VDE.
- Make sure that the power supply has been cut off for at least 5 minutes before you start working on the terminal box of the pump.

The electrical connections had to be done according to the following schematic

Connection scheme single-phase:



Connection scheme three-phase:



- Check out whether the power supply available corresponds to the data given on the nameplate.
- The motor must be equipped with a motor circuit-breaker or a pilotherm to protect it from overloading.

NOTE

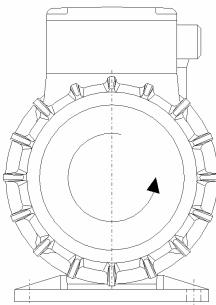
Motor protection devices are available with the pump's manufacturer.

5.4 Check sense of rotation

CAUTION!

Do not check the sense of rotation before the pump is filled with fluid.

- Fill the pump housing and the suction line with water or the fluid to be delivered.
- Check the sense of rotation of the motor by switching it on and off in immediate succession. The sense of rotation must be in accordance with the arrow figuring on the pump.
Slip a soft material, such as a paper strip, into the slits of the motor skirt to determine the sense of rotation.



- Mind the sense of rotation indicated by an arrow on the pump and verify it after installation.
- The motor has to be protected from overload by a motor-protection-switch or a thermo sensor.

NOTE!

Motor protection device are available by the supplier!

6 Operation

6.1 Preparations for starting

Always wear protective clothing!

- Fill the pump housing and the suction line with water or the fluid to be delivered.

CAUTION!

Avoid any dry-running of the pump!

NOTE!

We recommend installing dry-running protection devices such as flow monitors, contact manometers, differential pressure switches or level controllers.

- Tighten all screwed connections.
- Entirely open all valves of the suction line.

6.2 Starting the pump

- Switch on the motor
- Check the sense of rotation.
- Adjust the operating point by slowly opening the shut-off valve of the discharge line. If there is no shut-off valve installed to the discharge line, the operating point is automatically adjusted in accordance with the characteristic curve of the pump.

CAUTION!

Do not run the pump with the discharge line closed for a longer period of time. This may result in heating up the fluid inside the pump housing and damaging interior components of the pump.

CAUTION!

Always protect the pump from coarse impurities and magnetisable metal particles within the fluid delivered.

6.3 Operation

If the motor-circuit breaker switched off the pump motor, proceed as follows:

- Before switching on the motor again, check whether the impeller turns readily.
- Make sure that the suction line and the pump housing are filled with fluid.
- Switch on the motor.

If the pump delivers for a short period of time only and then stops pumping, the magnetic coupling has been disengaged. Proceed as described in chapter 8, Troubleshooting, below.

6.4 Shut-down procedure

- Switch off the motor.
- Close all valves.
- In case some fluid remains within the pump, secure the shut-off valves to prevent an accidental opening.
- If the pump is not to be used for some time, carefully rinse it off with a clean and neutral liquid. This is to prevent remaining fluid from depositing within the pump and the sleeve bearings.
 - If the pump is shut down for repair or maintenance work, lock the driving unit so that it cannot be switched on. Before dismantling the pump, close the suction and the discharge lines and empty the pump under controlled conditions.

Secure all valves to prevent an accidental opening.

Wear protective clothing.

6.5 Waste disposal

This product as a whole as well as parts of it should be disposed of in an environmentally safe way.

CAUTION!

Please comply with the respective regulations that are currently in force at your place (especially with regard to electronic scrap).

7 Service and maintenance

7.1 General information

This pump is designed for continuous operation and does not require specific maintenance.

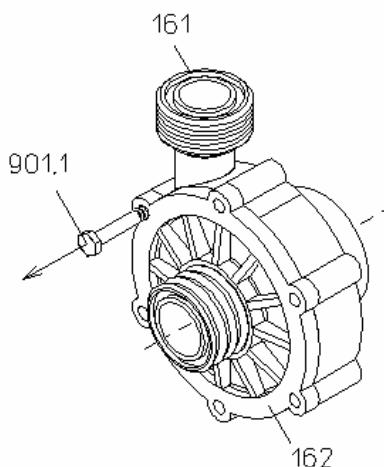
7.2 Preventive maintenance

- Although bearings, centering shaft and starting rings are designed for continuous operation, they should be periodically inspected for deposits. Disassembly of the pump head

7.3 Dismantling the pump head

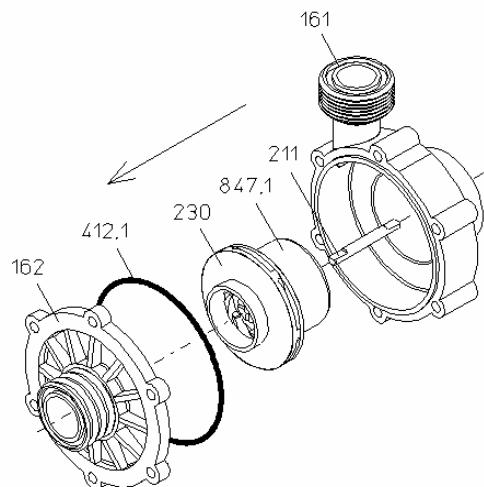
1. Remove the 6 screws (901.1) of the pump housing (101)

Required tool: open-end or ring spanner of size 10



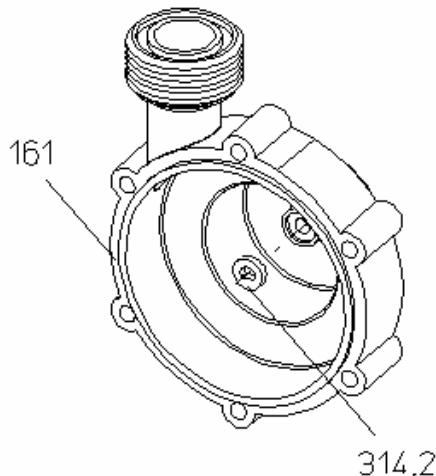
2. Take off the suction flange (162) from the pump housing (161). Pull out the impeller magnet with impeller (230 + 847.1) and the centering shaft (211).

Tools: No tools required!



3. Take off the thrust disc (314.1) of the pump housing (161)

Required tool: Centering shaft (211)!



4. Exchange of bearings (310.1 + 310.2) at impeller magnet and impeller (847.1 und 230)

a) Take off the tool of the impeller magnet in front direction (plug-in connection) and press the bearing out.

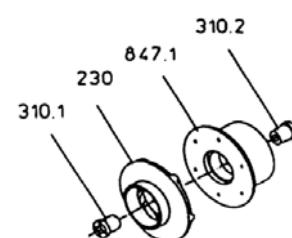
Tool: Screwdriver

b) Press out the bearing of the impeller magnet in rear direction.

Tool: Arbor

c) Put together impeller and magnet front direction (plug-in connection) and press the bearing out.

d) Press in the new bearings with lever press and arbor (centering shaft) good centered.



CAUTION!

After having replaced the bearings and before re-assembling the pump outlet/impeller casing, check manually if the impeller magnet (847.1) and bearings (310) really rotate on the centre shaft (211)!

To assemble the pump outlet/impeller casing, repeat step 1 to 3 in reverse order.

CAUTION!

After re-assembling the pump head, the impeller (230) and impeller magnet (847.1) should be able to slide axially on the centre shaft (211)!

- Any other repair than the replacement of word parts should be done only by an expert, since inappropriate maintenance word usually results in unnecessary costs.
- If the pump will not be in operation for a longer period of time, it should be cleaned carefully. Otherwise you risk that residues remaining in the pump may harden and jam the impeller, once the pump is started again.

8 Troubleshooting

Malfunction	Causes	Corrective action
Pump does not work when switched on	No voltage	Test the voltage
	Impurities in the pump housing	Remove the impurities
Magnetic clutch is disengaged	Specific gravity and/or viscosity of the fluid is too high	Reduce the delivery rate; use a stronger magnetic clutch and a more powerful motor
	Pump was switched off, then switched on again before the rotor stopped	The rotor should have stopped before the pump can be switched on again
Motor is overheating	Clogged ventilator cowl	Clean the ventilator and the cowl
	Motor is overloaded	Reduce the delivery rate Use a stronger motor
Pump is working, but not delivering	Gas accumulation in the lines	Evacuate the lines
	Valve in suction / delivery line is closed	Open the valves
Too much flow noise	Cavitation	Increase the suction line cross-section
		Reduce the delivery rate cool down the fluid
Pump is not sucking	No fluid in the pump	Open the vane
Delivery rate too low	Air in the system	Evacuate the system
	Suction and delivery line cross-sections are too small (significant losses)	Increase the suction and delivery line cross-sections
Delivery rate too high	Valve is not entirely open	Entirely open the valve
	Pump losses are less significant than presumed	Install a flow control valve in the delivery line

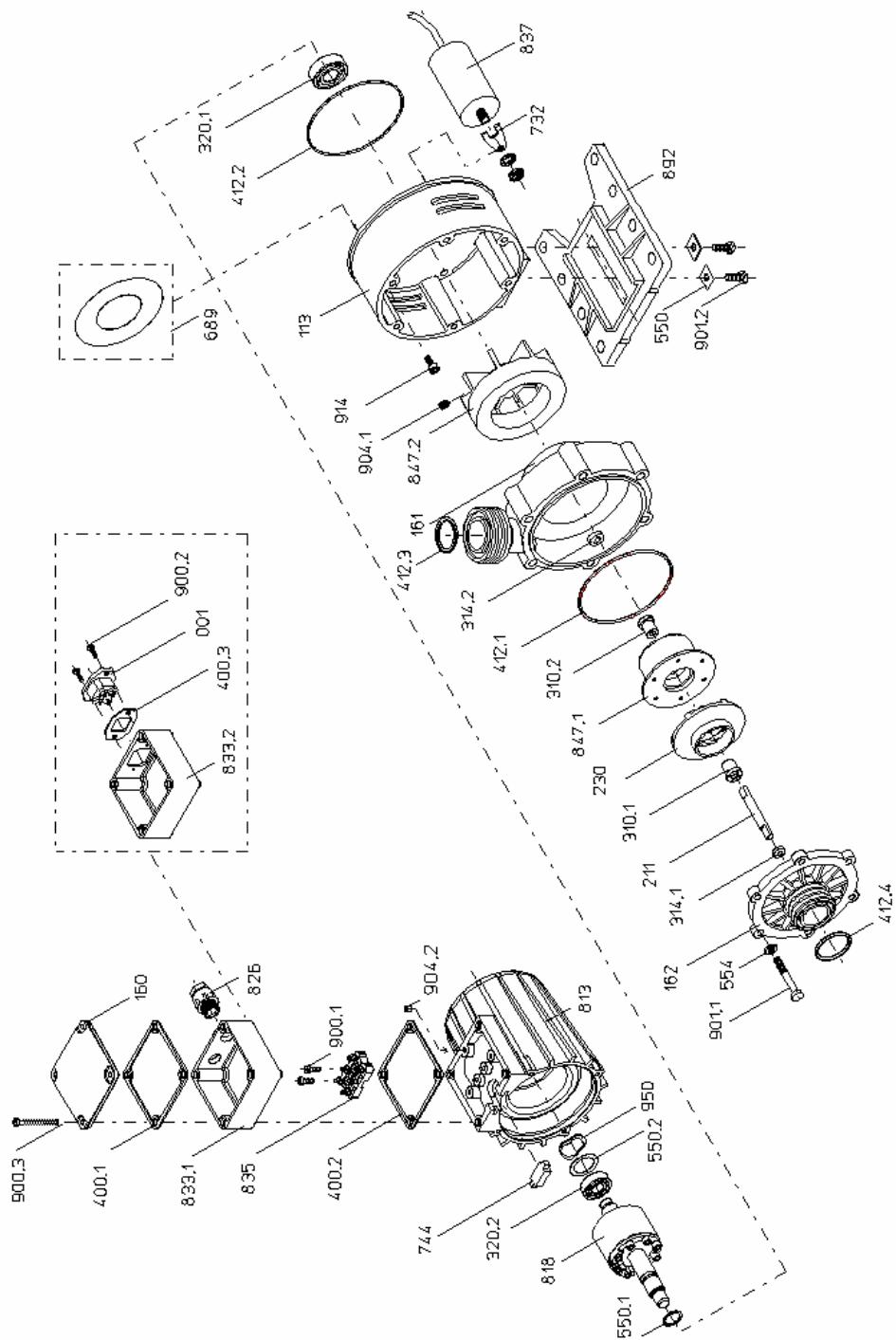
NOTE!

If the pump runs dry, the inner magnet usually bonds with the rear casing. Because of the impeller rotation, the fluid remaining in the pump housing heats up and evaporates. As the resulting frictional heat cannot be removed, the plastic material of the casing plasticizes and bonds with the inner magnet by "friction bonding". So do not run the pump with the discharge or the suction line closed for a longer period of time. Once the pump has run dry, liquid will leak out of the bore hole of the lantern between pump and motor. This means that the bonding of the interior parts with each other has resulted in a leaky rear casing.

9 Spare Parts

9.2 Exploded view

Drawing No. PUMA.02.Z.395.000



9.2 Spare Parts List

Item	Qty.	Description	Item	Qty.	Description
001	1	„Hirschmann“ plug socket GDM 3009	554	6	Washer 6,4 DIN 125 A 2
113	1	Motor lantern type 2	689	1	Insulated paper
160	1	Cover for terminal box type 2	732	1	Condenser holder
161	1	Pump housing type 2 G 1¼"	744	1	Sealing
162	1	Suction flange type 2 G 1¼"	813	1	Motor housing type 2
211*	1	Centering shaft ceramic type 2	818	1	Rotor
230*	1	Impeller type 2	826	1	Cable connection Pg 9
310.1*	1	Bearing ceramic type 2	833.1	1	Terminal box without cover type 2 Pg 9/11
310.2*	1	Bearing ceramic type 2	833.2	1	Terminal box for „Hirschmann“ plug socket
314.1*	1	Thrust disc ceramic type 2	835	1	Terminal board type 2
314.2*	1	Thrust disc ceramic type 2	837	1	Condenser
320.1*	1	Ball bearing 6202 ZZ C 2	847.1	1	Impeller magnet type 2
320.2*	1	Ball bearing 6001 ZZ	847.2	1	Drive magnet type 2
400.1	1	Seal for terminal box type 2	892	1	Footplate type 2 (PP)
400.2	1	Seal for terminal box type 2	900.1	2	Cylinder head bolt M4x12, DIN 84
400.3	1	Seal for „Hirschmann“ plug socket	900.2	2	Hirschmann-Befestigungsschraube M 3 x 35
412.1*	1	O – Ring for Housing 90 x 2,5	900.3	4	Cylinder head bolt M4x45 DIN 931 A 2
412.2*	1	O - Ring 93 x 2	901.1	6	Hexagon screw M 6x45, DIN 931, A 2
412.3*	1	O - Ring for pressure joint 26 x 3,5	901.2	2	Hexagon screw 6 x 16 DIN 933, A 2
412.4*	1	O - Ring for suction joint 30 x 3	904.1	1	Thread pin M 5 DIN 916 45 H
550	2	Rectangle disc A 2	904.2	1	Cylinder head bolt
550.1	1	Spacer washer	914	4	Hexagon socket head bolt M 5 x 12, DIN 912 A 2
550.2	1	Spacer washer	950	1	Corrugated spring

* Parts of wear and tear

NOTE!

When ordering spare parts, please indicate the items of the required parts, the pump type, the serial-no., motor output and the drawing no.

NOTE!

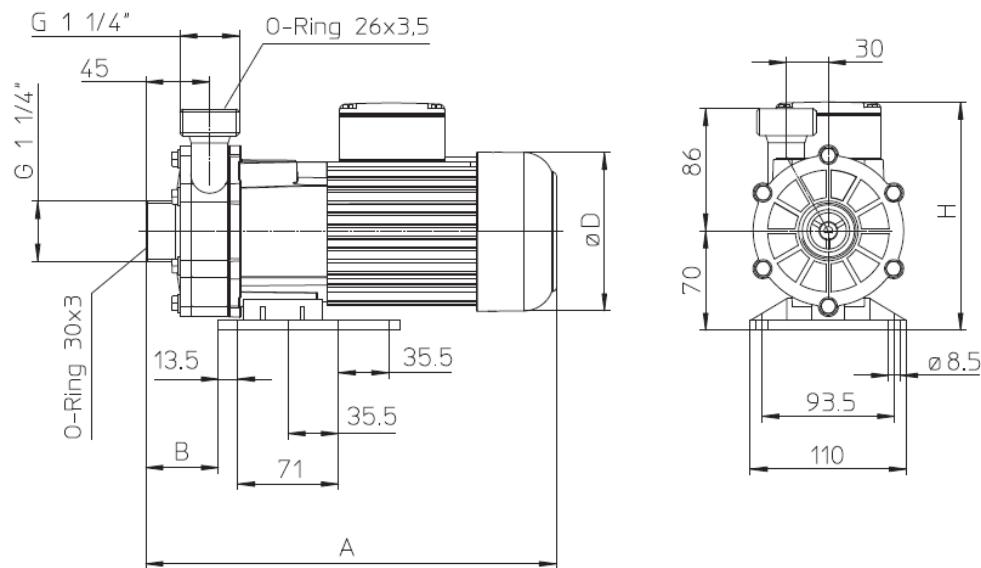
Item 689 is only required for motors with an output of 250 W.

Item 833.1 and 826 may be replaced at item 833.2, 400.3, 001 and 900.2.

Item 732 and 837 are only necessary in case of A.C. motors.

9 Appendix

9.1 Dimensioned drawing and specifications of RM- Type 2



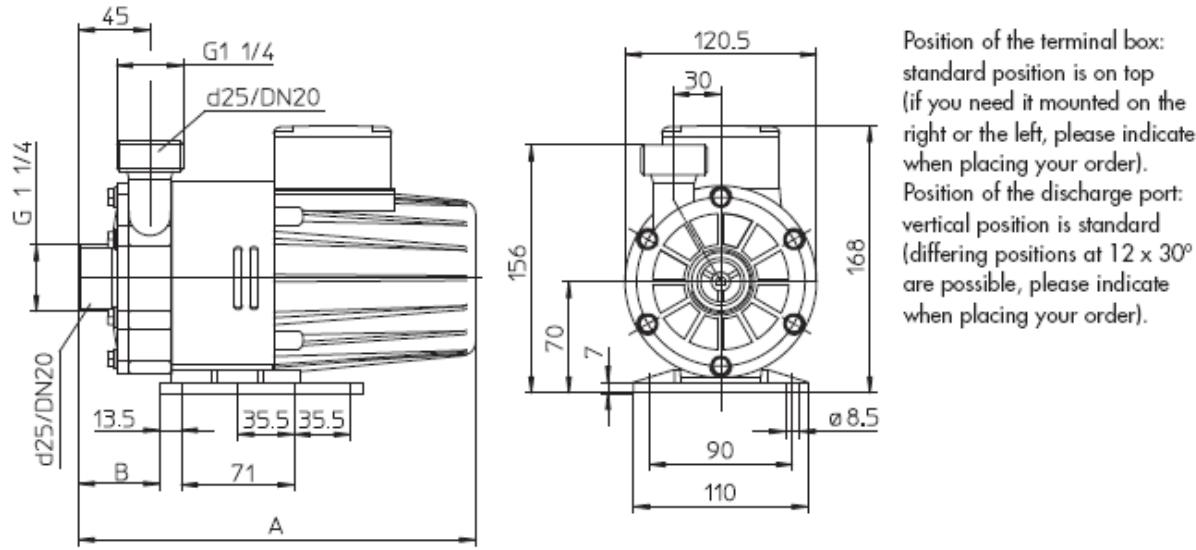
Position of the terminal box: standard position is on top (if you need it mounted on the right or the left, please indicate when placing your order).

Position of the discharge port: vertical position is standard (differing positions at 12 x 30° are possible, please indicate when placing your order).

TECHNICAL DATA

size	5/50	8/60	10/110
maximum delivery rate [l/min]	60	80	118
maximum delivery head [m wc]	5.0	7.3	9.5
maximum density [g/cm³] ***	2.0	1.5	2.0
motor capacity at 50 Hz [kW]	0.125	0.180	0.250
motor capacity at 60 Hz [kW]	0.150	0.216	0.300
current rating (400 V) [A]	0.5	0.8	1.02
rated speed at 50 Hz [min⁻¹]	2850	2850	2850
rated speed at 60 Hz [min⁻¹]	3440	3440	3440
weight (approx.) [kg]	5.7	6.6	6.8
dimension A (ca.) [mm]	289	289	304
dimension D (ca.) [mm]	112	112	123
dimension H (ca.) [mm]	160.5	160.5	168
dimension B [mm]	continuously adjustable from 20 to 45 mm		
voltage**	230 V ac or 230/400 V three-phase current		
protection class	hose-proof according to IP 55		
ports	suction side G 1 1/4"	discharge side G 1 1/4"	
recommended maximum flow rate	suction side 1 m/s	discharge side 3 m/s	
material	PP	PVDF	
maximum temperature	80 °C	95 °C	
maximum system pressure at 20 °C	1.0 bar	2.0 bar	

9.2 Dimensioned drawing and specifications of RM- Type 2U (non ventilated)



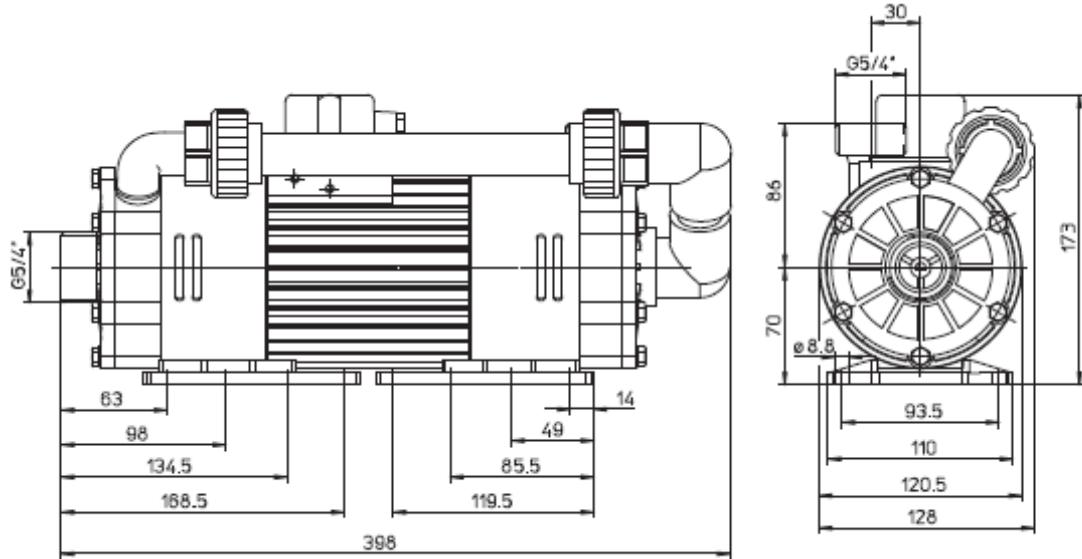
Position of the terminal box:
standard position is on top
(if you need it mounted on the
right or the left, please indicate
when placing your order).
Position of the discharge port:
vertical position is standard
(differing positions at 12 x 30°
are possible, please indicate
when placing your order).

size	5/50			7/40			8/60			10/100			10/110		12/130*
maximum delivery rate [l/min]	60			70			80			100			118		130
maximum delivery head [m wc]	5.0			6.5			7.3			8.4			9.5		12.0
maximum density [g/cm³]***	1.2	2.2	2.5	1.3	2.5	1.0	1.45	2.0	1.0	1.4	0.8	1.1	1.0	1.0	1.0
motor capacity at 50 Hz [kW]	0.09	0.18	0.25	0.12	0.25	0.12	0.18	0.25	0.18	0.25	0.18	0.25	0.18	0.25	–
motor capacity at 60 Hz [kW]	0.108	0.216	0.30	0.14	0.30	0.14	0.216	0.30	0.216	0.30	0.216	0.30	0.216	0.30	0.37
current rating (400 V) [A]	0.35	0.65	0.65	0.45	0.65	0.45	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	1.02
rated speed at 50 Hz [min⁻¹]	2850			2850			2850			2850			2850		–
rated speed at 60 Hz [min⁻¹]	3440			3440			3440			3440			3440		3440
weight (approx.) [kg]	5.2	6.6	6.6	5.7	6.6	5.7	6.6	6.8	6.6	6.8	6.6	6.8	6.6	6.8	7.5
dimension A [mm]	235	250	265	250	265	250	265	265	265	265	265	265	265	265	310
dimension B [mm]	continuously adjustable from 20 to 45 mm														

* Available only in 60 Hz.

*** With maximum volume rate of flow. To deliver liquids with a higher relative density, the pump has to be throttled (see the following performance chart).

9.3 Dimensioned drawing and specifications of RM-Twin Pump 2D

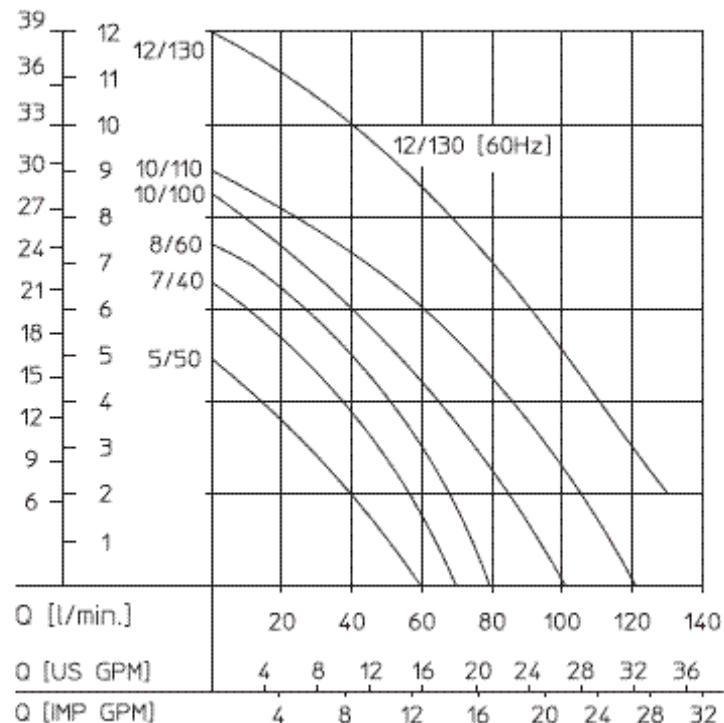


size	8/60	8/60 series connection
maximum delivery rate [l/min]	2 x 80	60
maximum delivery head [m wc]	7.3	16
maximum density [g/cm ³]***	1.0	1.3
motor capacity at 50 Hz [kW]	250	250
motor capacity at 60 Hz [kW]	300	300
current rating (400 V) [A]	0.65	0.65
rated speed at 50 Hz [min ⁻¹]	2850	2850
rated speed at 60 Hz [min ⁻¹]	3440	3440
weight (ca.) [kg]	8.5	9.0

voltage**	230 V ac or 230/400 V three-phase current	
protection class	hose-proof according to IP 55	
ports	suction side G 1 ¹ / ₄	discharge side G 1 ¹ / ₄
recommended maximum flow rate	suction side 1 m/s	discharge side 3 m/s
material	PP	PVDF
maximum temperature	80 °C	95 °C
maximum system pressure at 20 °C	2.5 bar	3.5 bar

9.4 Capacity curves

H [ft] H [m WS]



Q [l/min.]

Q [US GPM]

Q [IMP GPM]

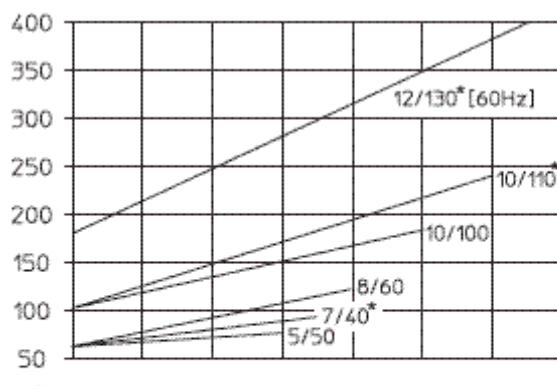
20 40 60 80 100 120 140

4 8 12 16 20 24 28 32 36

4 8 12 16 20 24 28 32

MOTORLEISTUNG
[W]

NPSH
[m]



12/130* [60Hz]

10/110

10/100

8/60

7/40*

5/50

* nur als 2U mit unbelüftetem Motor lieferbar

Messwerte ermittelt mit Wasser (20°C)

11 Labour protection and accident prevention

NOTE

In order to protect their employees and other people as well as the environment from harmful influences and effects when handling hazardous substances, industrial and commercial companies are obliged to comply with legal provisions referring to labour protection such as the German Workplace Regulations (ArbStättV), Hazardous Substances Regulations (GefStoffV) and regulations for the prevention of accidents, as well as environmental regulations such as the German Waste Act (AbfG) and the Water Resources Law (WHG).

We therefore ask you to enclose a declaration of harmlessness with any pump or component you send us for repair. With this form duly filled in and signed, you declare that the pump or the component was cleaned and thoroughly rinsed with neutral fluid before being shipped to us. Notwithstanding this, we reserve the right to refuse acceptance of repair orders for any other reason.

So SONDERMANN products and their components are neither serviced nor repaired unless this declaration of harmlessness is enclosed (see page below).

Pumps that have been operated with radioactive substances are not accepted at all.

In case that, although the pump was carefully emptied and cleaned, we have to take any safety precautions, you have to give us the necessary information when sending the pump or its component.

12 Declaration of harmlessness

The undersigned herewith declares that the following pump and its accessories are harmless and asks you to service and/or repair it or them.

Type of the pump:

.....
.....

Serial number:

.....

Date of delivery:

.....

Kind of problem:

.....
.....

We herewith declare that

the pump was not used to deliver harmful or noxious substances;

it was used with the following fluids:

.....
.....

before being shipped, the pump was carefully emptied and cleaned inside and out;

it is not necessary to take any special safety precautions;

you have to take the following safety precautions with regard to residual fluids and waste disposal:

.....
.....

Date:

signature:

S O N D E R M A N N

PUMPEN + FILTER GMBH & Co. KG

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Subject to technical modification